Assignment 1

OOP Lab

Section V Total Marks: 20

Instructor: Md Ajwad Akil

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1 Circle Problem - 10

You are to create a circle class and a color class and use the object of the color class inside the circle class.

1.1 Problem Description:

First, you need to create the Color class. Follow the below instructions:

1. Create a **Color** class with three properties **R, G, B** which stands for Red, Green and Blue. The properties should be of double type.
2. Create a constructor for the class to set the values of the three variables.
3. Create appropriate getters and setters to obtain and set the **three** variables at once. You should create only one getter and one setter here.

Now create the appropriate Circle Class. Follow the below instructions:

1. Now create a Public Circle class in a separate file. The circle class should have properties x,y, and radius. Consider all the properties as double data types. You should also declare a double variable named PI.
2. The circle class should also have a **Color** object as its property.
3. Write an appropriate constructor to set the x and y centers and radius. You should also pass in **R, G, and B** values in the Circle constructor to set the Color object in the constructor. You should also set the value of PI as 3.1416 in the constructor. Here is a snapshot of the constructor definition:

   Circle(double X, double Y, double radius, double R, double G, double B)

   Use the passed value of **R, G, and B** to create the appropriate Color object inside the Circle constructor.
4. Write separate getters and setters to obtain the radius, center (x and y together), and Color object. You should, in total, create three getters and three setters.
5. Write a method in the **Circle** class named **calculateArea()** to calculate the area of the circle. The method should return the area of the circle as a double variable. Your method should not take any parameters, only calculate the circle area and return the value.
6. Write a method in the **Circle** class named **calculateCircumference** to return the circle's circumference. Your method should not return any value but print the circumference after calculation.

1.2 Testing the program

Now, write appropriate code to test the methods you just created. Create a Circle object with a center of 2, 3, a radius of 10, and RGB values of 4, 4, 4. Then you should call **calculateArea()** and then print the values and call **calculateCircumference()**.

2 Array Manipulator Problem - 10

You are to create an ArrayManipulator Class to modify a given array in various ways.

2.1 Problem Description:

First, you need to create the Public Array class. Remember, for this problem, you need to create a single public class. Follow the below instructions:

1. Create an ArrayManipulator class with an integer array as its property/class member. Do not initialize the array. Just declare it as a reference.
2. Create a constructor for this class that takes the array's length as input. Now initialize the array with the appropriate length.
3. Create a public method called **fillArray** that uses the Scanner class to take input to fill up the array. The method should not return anything.
4. Create a public method called **printArray** to print the elements of the array of the class. The method should not return anything.
5. Create a public method called **insertItem(int position, int value)**. The method will insert the value passed as an argument to the position of the array, which is also passed as an argument. The method should not return anything and print the statement: **'value' has been placed at position no 'position.'**. Please place the value and position accordingly. If the value is 10 and the position is 0, then you should print **10 has been placed at position no 0.**
6. Create a public method called **deleteFromPosition(int position)**. The method should delete the element at the position indicated by the argument. For example, if the position is 10, then the element at position 10 should be deleted. After deletion, you should print **The element at position no 10 has been deleted**. Remember to use the position you passed as an argument during printing for this method. Your method should not return anything.

2.2 Testing the program

Now, write appropriate code to test the methods you just created. Create an ArrayManipulator Object and set the length of the array to 5. Take input from the user to fill the array using the **fillArray** method. The input should be 1, 2, 3, 4, 5. Then print the array with **printArray** method. Then insert a value of 50 at position no 0 using **insertItem(50,0)** method you created earlier. Then again, print the array after insertion. The output should be 50, 1, 2, 3, 4, 5. Then finally, test the deletion method by deleting an item from position 2 of the array. Use **deleteFromPosition(2)** method you created earlier.

3 Marks Distribution for Problem 1

Section	Marks
Color class	2
Circle class - 1,2	1
Circle class - 3	1
Circle class - 4	2
Circle class - 5	2
Circle class - 6	2
Total	10

4 Marks Distribution for Problem 2

Section	Marks
1	1
2	1
3	1
4	1
5	3
6	3
Total	10

Please Follow the guidelines below:

- Please solve the problems in the *Java* language. Please solve the problems by creating appropriate classes in the same Project.
- Zip the whole Intellij Project so I can directly run it. During zipping, you should name the folders in the following way: studentid_name_oop_1.zip. If your ID is 12345 and your name is akil, the zip file should be 12345_akil_oop_1.zip.
- **DO NOT COPY from the internet, seniors, batchmates, or any other sources. You are always welcome to discuss and find the solutions together, but you must write your code. If found out, there will be *-100%* marks reduction.**
- For any query, ask in class or email me at ajwad@cse.uiu.ac.bd or call me by phone: **01759099000**